

2015 Ag Mechanics CDE

Scoring

Participants will be scored as follows:

Top 3 scores count for overall team score

	<u>Individual</u>	<u>Team Points</u>
Team Activity (Small engines)	1/3 of team	150 points
Welding (MIG and stick)	50 points	150 points
Team Activity (Electricity)	1/3 of team	150 points
Emergency Paper Boom	1/3 of team	150 points
General Knowledge Exam I & II	<u>50 points</u>	<u>150 points</u>
Total points possible	250 points	750 points

Tiebreaker

The team score for the event will be determined by adding all the points earned by adding individual points as listed above. The following activities will be used to break ties between individuals and/or teams:

The highest written exam scores; if still tied top welding scores

Ag Mechanics CDE Score Sheets

2015

Name and FFA Chapter	General Knowledge	Electrical Activity	Welding Section	Team Event	Boom	Place
1.						
2.						
3.						
4.						
1.						
2.						
3.						
4.						
1.						
2.						
3.						
4.						
1.						
2.						
3.						
4.						
1.						
2.						
3.						
4.						
1.						
2.						
3.						
4.						

Name _____ Chapter _____

2015 Maine FFA Agriculture Mechanics CDE

Electrical Wiring

1. Followed wiring diagram (**5 points**) _____

2. Code correct (**2.5 per line**)

Box A ---Wiring _____

--- Bonding _____

Box B ---Wiring _____

--- Bonding _____

Box C---Wiring _____

---Bonding _____

3. Workmanship (**5 points each**)

Box A---Stripping _____

Clockwise around screw _____

Correct wire nut _____

Length of leads _____

Secure connectors _____

Box B---Stripping _____

Clockwise around screws _____

Correct wire nut _____

Length of leads _____

Secure connectors _____

Box C---Stripping _____

Clockwise around screws _____

Correct wire nut _____

Length of leads _____

Secure connectors _____

4. Overall neatness (**5 points**) _____

Total Points _____

Multiply by 1.5 _____

Name	School	Number
Total welding points		

2015 Ag Mechanics CDE

Welding Segment

MIG Section Scoring

Point Value	What judges will look for
1 2 3 4 5	No visible imperfections or spatter damage
1 2 3 4 5	High quality appearance
1 2 3 4	Proper welding apparel
1 2	Safety glasses worn at all times
1	Check for hazards
1 2	Proper handling of hot materials
1	Clean up and tool return
	Total points earned (20 possible)

Stick Welding Segment

Point value	What the judge is looking for
1 2 3 4 5 6 7 8 9 10	All pieces fit properly and are correctly located. Use Jig
1 2 3 4 5	High quality appearance
1 2 3 4	Proper welding apparel
1 2 3 4	Safety glasses worn at all times
1	Check for hazards
1 2 3	Proper chipping
1 2	Safe handling of hot metal
1	Clean up and tool return
	Total points earned (30 possible)

2015 Team Activity

Preparing a Generator Engine for Spring

Your team of small engine technicians is responsible for preparing a generator for sale to customers this season. Your job is to get the following services done in the allotted time:

1. Drain old oil and choose the correct oil and amount from the supplied oil containers. Before you add the oil you must tell why you selected the particular oil and the correct amount. You must use the manual provided. The judge will then only allow you to put the correct oil and correct amount.

Oil brand _____

Oil viscosity SAE _____

API specs _____

Amount _____ ounces

Oil added correctly _____

2. Check for spark using the Briggs and Stratton approved tester. Also check the spark plug for spark condition.

Spark present at the tester _____ yes _____ no

Spark plug _____ good do not replace _____ replace

3. Check the air filter condition. Air filter okay _____ not okay _____
4. Check engine compression using the supplied compression tester. Turn the engine over at least 3 times. Most small engine mechanics say you need at least 50 psi for the engine to run. Your compression _____ psi
5. Add about one inch of fuel to the fuel tank. Then attempt to start the engine. Put all tools away and then put gasoline into the supplied fuel can.

TEAM SCORE SHEET ON BACK

Team Activity Score Sheet 2015

1. Oil brand	5 points _____
Viscosity	10 points _____
API specs	10 points _____
Amount	10 points _____
Added correctly	10 points _____
2. Spark test done correctly	10 points _____
3. Decision about spark plug	20 points _____
4. Air filter decision	10 points _____
1. Engine compression check	10 points _____
2. Engine running correctly	20 points _____
3. Safety	20 points _____
4. Clean up and fuel returned to container	15 points _____
Total	

Integrated Pest Management General Knowledge Part II

FFA Chapter Name _____ Total Score _____

The spray mechanism represents two nozzles on a boom sprayer that Brookview Country Club has hired you to prepare for use this year at the golf course. The sprayer is to operate at 30 psi with the correct nozzles on 20 inch spacing.

Use the Spraying Systems Catalog 51A page 12 to determine the amount of water to be collected from the flat fan nozzles. You will be using only the XR TeeJet™ for this test. The nozzle selection is based on 20 gallons per acre at 4 miles per hour with a 30 psi pressure setting. From this determine which nozzle will correct amount of water at 30 psi.

The TeeJet Vari Spacing™ clamps need to be attached to the 1 x1 inch boom section. The nozzle bodies must be assembled to the clamp with correct parts.

Identify the sprayer parts using the word bank

Sample	Number only	Points
A		
B		
C		
D		
E		
	Total points	

Parts ID Word Bank

1	spray nozzle
2	cap
3	pump
4	nozzle body
5	cam lever coupling
6	spray gun
7	roller pump
8	pressure gauge
9	strainer
10	calibration container
11	pressure regulator valve

1. What is the part number for the nozzle that will give you 20 GPA at 4 miles per hour @ 30 psi?

Color _____

XR_____

XR_____

2. Let us assume you want the boom to be further away from the crop and you are using 20 inch spacing what will be the height of the nozzle?

_____ Inches

3. What will the mesh screen for this nozzle? Circle the correct answer.

a. 50 mesh

b. 100 mesh

4. Assemble a nozzle to a nozzle body.

a. Correct nozzle

b. Assembly correct

Emergency Spray Boom

While spraying for Brookview Golf Course the end of your spray boom bent so bad that you had to cut off 30 inches. You do not have a welder but you do have paper. That's right, paper. Good old white copier paper.

For this portion of the Ag Mechanics CDE you must build **before** you get to FFA State Convention a paper replacement boom. No time will be allotted to construct this boom at the CDE.

The boom must be 30 inches long plus or minus $\frac{1}{2}$ inch. The Tee Jet Vari Spacing™ clamp must fit in the middle of the boom. For this test it will be at the middle of the paper boom.

The boom will be soaked in water for 10 minutes thus it must be waterproof. This is because it is a spray boom.

Team boom may not have any wood, fiberglass, carbon fiber, plastic in any portion of the 30 inch section. Any non-epoxy glue is okay as long as it is not fiberglass resin.

The segment must sit flat on a table plus or minus $\frac{3}{4}$ ". This will be measured prior to soaking in water.

The testing device will have a gap exactly 1". The insert length is 8". Refer to CDE photo for more information. For the **Middle Load 9 (static load test 1)** and the **Basketball Drop Test** your boom will have two such fixtures, one on each end. For the **Turn 90° test (static test 2)** only one fixture will be clamping your boom.

Test Descriptions

Basketball drop test- a boy's basket ball will be dropped 5 times onto the center of the test segment. The drop will be 6 feet. A visual inspection will follow the 5 drops.

Static load test 1- the segment will have a vertical load of 5 pounds to check for bending. This load will be five minutes in duration. The boom will be in its normal nozzle facing down mode with each end supported by the holders.

Static load test 2 – the segment will then be turned 90° and secured from one end only. The 5 pound weight will be hung from the center once again for five minutes. A visual inspection will follow both static tests.

Weight test – each 30" segment will be weighed. The lightest will get full points. Each of the heavier booms points will be determined by this formula:

Step 1. Lightest weight in grams ÷ your team weight in grams = X

Step 2 Multiply your answer X full points = Your score (round to even number with no decimal)

Example: Lightest boom 454 grams & your boom 625 grams. Full score 10 points

Step 1. 454 grams ÷ 625 grams = .73

Step 2. .73 X 10 points = 7.3 or 7 points

Cut segment – The segment will then be cut in two places to inspect for prohibited building materials. Cut locations are determined by the judge.

Your team score

Boom Tests	Points Max	Points Earned
Water test	10	
Static load #1	10	
Static load #2	10	
Weight test	10	
Segment check	10	
	total	

2015 Ag Mechanics Questions

Mark all answers on the answer sheet using a pencil. Read each question carefully and identify the correct single answer. Use the blank sheet of paper to do all the scratch work. Students will need a calculator to complete this examination, but they are not allowed to share a calculator with another student.

1. What is the name of the device to measure tractor PTO (power take-off) horsepower?
2. A diesel engine produces white- colored exhaust. What is the most likely cause?
3. A diesel engine produces blue-colored exhaust. What is the most likely cause?
4. Which hydraulic system component converts mechanical energy into hydraulic energy?
5. Which of the following would be considered a fuel conservation technique?
6. A skid-steer loader is used to move soil from a stockpile. The loader used two 3- inch by 36-inch hydraulic cylinders to raise and lower the loader lift arms. If the loader's hydraulic system can generate a maximum pressure of 2,500 pounds per square inch, approximately what is the maximum lifting force (pounds) that each cylinder can produce?
7. A twenty-foot-long dump truck bed is 54 inches deep and seven feet wide. What is the approximate capacity of the truck bed in cubic yards if a load is struck level across the top?

8. Which of the following is the safest way to drive a loader uphill with a full bucket?

9. A John Deere utility tractor has been re-equipped with low profile tires (smaller diameter than the factory equipped tires) for orchard use. How will the smaller diameter tires change the relative ground speeds listed in the operator's manual for specific RPMs and gear settings? Assume both tire sizes are properly inflated.

10. When the piston of the four stroke small engine reaches the bottom of the cylinder on the intake stroke it starts upward on what stroke?

11. The intake valve of a 4-stroke single-cylinder small engine is opened and closed by the action of what component?

12. A partially sheared flywheel key can result in which of the following?

13. In four-stroke small gasoline engines, how fast does the camshaft turn with respect to the speed of the crankshaft?

14. What is the name given to the printed safety information that must be kept on file for each hazardous material kept or used in a small engine shop?

15. How much torque in ft-lbs is applied to a head bolt by applying 120 pounds of force on the end of a wrench 12 inches in length? Note: Torque in ft-lbs = (Force in pounds) x (length of lever arm in feet)

16. In electrical terminology, what is the meaning of the abbreviation AC?

17. Which of the following statement is correct with respect to wearing safety glasses while welding?

18. Approximately how much time is required to remove 750 round hay bales from a field if bale transport can be completed at an average hauling rate 11.5 bales per hour? Note: 1 hour= 60 minutes.

19. A tractor fueled by No. 2 diesel burns 7.75 gallons per hour. When the same tractor is fueled with B20 biodiesel it burns 8.25 gallons per hour. Approximately how many more gallons of fuel will the tractor use during eight hours of operation if it is fueled by B20 biodiesel rather than No. 2 diesel?

20. What tractor power train component directs power equally to both rear wheels to prevent the loss of traction that occurs when one wheel is slipping?

21. If the measured tractor wheel slippage is zero, what adjustment can increase wheel slippage?

22. Why do engine manufactures recommend that fuel stabilizer be added to fuel left in gasoline engines, such as lawnmowers and snow blowers, when the equipment will not be used from one season to the next?

23. When pulling or towing a trailer with a tractor, what is the correct place to connect the load?

24. When a hydraulic leak is suspected to originate from an implement hose, which of the following is the correct procedure to locate the leak?

25. Which of the following statement about the American Wire Gauge (AWG) conductor rating system is true?

26. A non-metallic sheathed cable that contains two #12 insulated conductors (white and black) and one bare grounding conductor would be identified by which of the following markings?

27. According to Article 547 of the National Electric Code, all electrical wiring cable in agricultural application shall be secured with how many inches of exiting a box?

28. At least how many inches of free conductors shall be left at each outlet, junction, and switch point for splices or the connection of fixtures or devices?

29. When operation a tractor on a road or highway, which of the following is correct regarding brakes?

30. When using 12-2 WG nonmetallic-sheathed cable in a 120-volt electrical lighting circuit, which conductor should a single pole, single throw light switch controls (make or break the connection)?

31. The best spray tip to select for superior wear life is:

32. A(n) _____ uses spinning disks (or cups) to break liquid into uniform sized droplets by centrifugal force.

33. Chemical application rates can be increased by:

34. Nozzles with wider spray angles permit_____, thereby reducing the potential for drift.

35. The first step in sprayer calibration is to check two important factors related to nozzles:

36. When calibrating a sprayer, if the measured gallon per minute value is slightly lower or higher than the required level, the easiest method of fine tuning the flow rate is:

37. When calibrating a sprayer, if the gallons per acre value determined is much lower or higher than the required level, the preferred method of correction is:

38. Changing sprayer operating pressure can change:

39. The pump of a tractor mounted sprayer is usually driven by a(n):

40. A(n) _____ produces positively charged insecticides as the solution leaves the nozzles.

41. A 48-foot-wide spray boom with spray tips that have a flow rate of 0.4 gallons per minute and are spaced on 20- inch centers will produce an application rate of _____ gallons per acre when the sprayer travels at 6 miles per hour.

42. If nozzle pressure was increased from a level of 10 psi to 40 psi, output flow rate would be:

43. Most 80 flat fan spray tips have _____% spray overlap to ensure even distribution for broadcast application.

44. The _____ controls the pressure developed by a sprayer and, indirectly, the quantity of spray material delivered by the nozzles.

45. Which of the following is the signal word used to identify high toxicity (category) pesticides?

46. The first step in effective pest management is

47. A reaction to a pesticide that occurs from a single incident, such as when a person ingests a pesticide and loses consciousness immediately, is known as a

48. A measure of the relative oral or dermal toxicity of a pesticide is measured in

49. MSDS stand for

50. What is the most common type of pesticide exposure?

51. The proper footwear to use for handling a pesticide carrying the signal word "Danger" would be

52. The major danger posed to bystander by a walk behind rotary mower is

53. Which of the following is appropriate footwear for mowing with a walk behind rotary mower?

54. Oral ingestions of pesticides can occur from

55. Clothing worn applying pesticides

56. Empty pesticide containers should be